

WHAT IS CLAIMED IS:

1. Surface-crosslinked superabsorbent particles comprising:

- 5 (i) about 50% to about 88%, by weight, of a superabsorbent polymer, said superabsorbent polymer comprising about 0.001% to about 5%, by weight, of a surface crosslinking agent;
- (ii) about 12% to about 35%, by weight, of a clay, said clay present in the vicinity of surfaces of the superabsorbent particles; and
- 10 (iii) 0% to about 25%, by weight, of an inorganic network builder,

said particles prepared by a method comprising the steps of:

- 15 (a) polymerizing one or more monomers capable of providing a superabsorbent polymer in the presence of an internal crosslinking monomer to form a superabsorbent polymer hydrogel;
- (b) comminuting the superabsorbent polymer hydrogel to form superabsorbent polymer hydrogel particles;
- 20 (c) drying the superabsorbent polymer hydrogel particles of step (b) to provide dry superabsorbent particles;
- (d) applying a mixture comprising a surface crosslinking agent and a clay to the surface of the superabsorbent particles of step (c) to provide surface-treated superabsorbent polymer particles; and
- 25 (e) then heating the surface-treated superabsorbent polymer particles for a sufficient time at a sufficient temperature to surface crosslink the surface-treated superabsorbent polymer particles and position the clay in the vicinity of the surfaces of the surface-crosslinked superabsorbent particles.

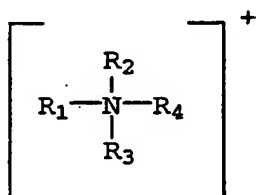
- 30 2. The particles of claim 1 wherein the superabsorbent polymer is present in an amount of about 55% to about 85%, by weight, and the clay is present in an amount of about 15% to about 25%, by weight.

- 35 3. The particles of one of the claims 1 or 2 wherein the inorganic network builder is present in an amount of about 5% to about 20%, by weight.

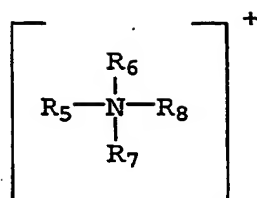
- 40 4. The particle of one of the claims 1 to 3 wherein the inorganic network builder is selected from the group consisting of a silicate, an aluminate, and an aluminosilicate.

5. The particle of one of the claims 1 to 4 wherein the inorganic network builder comprises sodium silicate, sodium aluminate, or a mixture thereof.
- 5 6. The particles of one of the claims 1 to 5 wherein less than 5%, by weight, of the particles have a diameter of 200 μ m or less.
7. The particles of one of the claims 1 to 6 wherein the superabsorbent polymer comprises a polymerized α,β -unsaturated carboxylic acid, or salt or anhydride thereof.
- 10 8. The particles of one of the claims 1 to 6 wherein the monomer is selected from the group consisting of acrylic acid, methacrylic acid, ethacrylic acid, α -chloroacrylic acid, α -cyanoacrylic acid, β -methylacrylic acid, α -phenylacrylic acid, β -acryloxypropionic acid, sorbic acid, α -chlorosorbic acid, angelic acid, cinnamic acid, p-chlorocinnamic acid, β -stearylacrylic acid, itaconic acid, citraconic acid, 15 mesaconic acid, glutaconic acid, aconitic acid, maleic acid, fumaric acid, tricarboxyethylene, maleic anhydride, vinyl sulfonic acid, allyl sulfonic acid, vinyl toluene sulfonic acid, styrene sulfonic acid, sulfoethyl acrylate, sulfoethyl methacrylate, sulfopropyl acrylate, sulfopropyl methacrylate, sulfopropyl acrylate, 20 sulfopropyl methacrylate, 2-hydroxy-3-methacryloxypropyl sulfonic acid, 2-acrylamido-2-methylpropane sulfonic acid, methacryloxy ethyl phosphate, and mixtures thereof.
- 25 9. The particles of one of the claims 1 to 6 wherein the superabsorbent polymer is selected from the group consisting of poly(acrylic acid), a hydrolyzed starch-acrylonitrile graft copolymer, a starch-acrylic acid graft copolymer, a saponified vinyl acetate-acrylic ester copolymer, a hydrolyzed acrylonitrile copolymer, a hydrolyzed acrylamide copolymer, an ethylene-maleic anhydride copolymer, an isobutylene-maleic anhydride copolymer, a poly(vinylsulfonic acid), a 30 poly(vinylphosphonic acid), a poly(vinylphosphoric acid), a poly(vinylsulfuric acid), a sulfonated polystyrene, and salts and mixtures thereof.
- 35 10. The particles of one of the claims 1 to 6 wherein the superabsorbent polymer is selected from the group consisting of a poly(vinylamine), a poly(dialkyl-aminoalkyl (meth)acrylamide), a polyethylenimine, a poly(allylamine), a poly(allylguanidine), a poly(di-methyldiallyl ammonium hydroxide), a quaternized polystyrene derivative, a guanidine-modified poly-styrene, a quaternized poly((meth)acrylamide) or ester analog, a poly(vinylguanidine), and salts and 40 mixtures thereof.

11. The particles of one of the claims 1 to 6 wherein the superabsorbent polymer comprises polyacrylic acid neutralized about 25% to 100%.
- 5 12. The particles of one of the claims 1 to 11 wherein the clay is a swelling clay selected from the group consisting of montmorillonite, saponite, nontronite, lapo-
nite, beidelite, hectorite, sauconite, stevensite, vermiculite, volkonskoite, magadite, medmontite, kenyaite, and mixtures thereof.
- 10 13. The particles of one of the claims 1 to 11 wherein the clay is a nonswelling clay selected from the group consisting of a kaolin mineral, a serpentine mineral, a mica mineral, a chlorite mineral, sepolite, palygorskite, bauxite, and mixtures thereof.
- 15 14. The particles of claim 13 wherein the nonswelling clay comprises a kaolinite.
15. The particles of one of the claims 1 to 11 wherein the clay is an organophilic clay having an organic component and an inorganic component.
- 20 16. The particles of claim 15 wherein the inorganic component of the organophilic clay comprises smectite, bentonite, hectorite, montmorillonite, beidelite, saponite, stevensite, nontronite, illite, attapulgite, a zeolite, fuller's earth, and mixtures thereof.
- 25 17. The particles of one of the claims 15 or 16 wherein the inorganic component of the organophilic clay comprises montmorillonite.
18. The particles of one of the claims 15 to 17 wherein the organic component of the organophilic clay comprises



30 wherein R₁ is an alkyl group having at least 20 carbon atoms, R₂ is hydrogen, benzyl, or an alkyl group having at least 10 carbon atoms, and R₃ and R₄, independently, are a lower alkyl group;



wherein R_5 is CH_3 or $C_6H_5CH_2$, R_6 is $C_6H_5CH_2$, and R_7 and R_8 , independently, are alkyl groups containing long chain alkyl radicals having 14 to 22 carbon atoms; or a mixture thereof.

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19. The particles of one of the claims 15 to 18 wherein the organophilic clay is selected from the group consisting of dimethyl benzyl (hydrogenated tallow) ammonium bentonite, methyl benzyl di(hydrogenated tallow) ammonium bentonite, dimethyl di(hydrogenated tallow) ammonium bentonite, methyl bis(2-hydroxyethyl) octadecyl ammonium bentonite, a bentonite clay treated with an amine containing three to eight carbon atoms, and mixtures thereof.
20. A method of absorbing an aqueous medium comprising contacting the medium with the superabsorbent particles of one of the claims 1 to 19.
21. The method of claim 20 wherein the aqueous medium contains electrolytes.
22. The method of claim 21 wherein the electrolyte-containing aqueous medium is selected from the group consisting of urine, saline, menses, and blood.
23. An absorbent article comprising the superabsorbent particles of one of the claims 1 to 19.
24. The article of claim 23 wherein the article is a diaper or a catamenial device.
25. A diaper having a core, said core comprising at least 10% by weight of the superabsorbent polymer of one of the claims 1 to 19.
26. The diaper of claim 25 further comprising a topsheet in contact with a first surface of the core, and a backsheet in contact with a second surface of the core, said second core surface opposite from said first core surface.
27. The diaper of claim 26 further comprising an acquisition layer disposed between the topsheet and the core.

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28. A method of manufacturing surface-crosslinked superabsorbent polymer particles having a clay positioned in a vicinity of surfaces of the particles comprising the steps of:
- 5 (a) forming an aqueous monomer mixture comprising (i) at least one monomer capable of forming a superabsorbent polymer, (ii) an internal crosslinking agent, and (iii) a polymerization catalyst;
 - (b) polymerizing the monomer in the aqueous mixture to form a superabsorbent polymer hydrogel;
 - 10 (c) comminuting the superabsorbent polymer hydrogel to provide superabsorbent polymer hydrogel particles;
 - (d) drying the superabsorbent polymer hydrogel particles for a sufficient time at a sufficient temperature to provide dry superabsorbent polymer particles;
 - (e) applying a mixture of a clay and a surface crosslinking agent to surfaces of
15 the dry superabsorbent polymer particles to provide surface-treated superabsorbent polymer particles; and
 - (f) heating the surface treated superabsorbent polymer particles for a sufficient time at a sufficient temperature to surface crosslink the surface treated superabsorbent polymer particles and position the clay in the vicinity of the
20 surfaces of the particles.
29. The method of claim 28 wherein the monomer capable of forming the superabsorbent polymer is selected from the group consisting of acrylic acid, methacrylic acid, ethacrylic acid, α -chloroacrylic acid, α -cyanoacrylic acid, β -methacrylic acid, α -phenylacrylic acid, β -acryloxypropionic acid, sorbic acid, α -chlorosorbic acid, angelic acid, cinnamic acid, p-chlorocinnamic acid, β -stearylacrylic acid, itaconic acid, citraconic acid, mesaconic acid, glutaconic acid, aconitic acid, maleic acid, fumaric acid, tricarboxyethylene, maleic anhydride, vinyl sulfonic acid, allyl sulfonic acid, vinyl toluene sulfonic acid, styrene sulfonic acid,
25 sulfoethyl acrylate, sulfoethyl methacrylate, sulfopropyl acrylate, sulfopropyl methacrylate, sulfopropyl acrylate, sulfopropyl methacrylate, 2-hydroxy-3-methacryloxypropyl sulfonic acid, 2-acrylamide-2-methylpropane sulfonic acid, methacryloxy ethyl phosphate, and mixtures thereof.
30. The method of claim 28 wherein the superabsorbent polymer is selected from the group consisting of poly(acrylic acid), a hydrolyzed starch-acrylonitrile graft copolymers, a starch-acrylic acid graft copolymer, a saponified vinyl acetate-acrylic ester copolymer, a hydrolyzed acrylonitrile copolymer, a hydrolyzed acrylamide copolymer, an ethylene-maleic anhydride copolymer, an isobutylenemaleic anhydride copolymer, poly(vinylsulfonic acid), poly(vinylphosphonic acid), po-
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- 5 ly(vinylphosphoric acid), poly(vinylsulfuric acid), sulfonated polystyrene, a poly(vinylamine), a poly(dialkylaminoalkyl (meth)acrylamide), a lightly crosslinked polyethylenimine, a poly(allylamine), a poly(allylguanidine), a poly(dimethyldiallylammonium hydroxide), a quaternized polystyrene derivative, a guanidine-modified polystyrene, a quaternized poly((meth)acrylamide) or ester analog, and mixtures thereof.